

Docket:	:	<u>R.06-04-010</u>
Exhibit Number	:	_____
Commissioner	:	<u>Dian Grueneich</u>
Admin. Law Judge	:	<u>Meg Gottstein</u>
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**Division of Ratepayer Advocates  
California Public Utilities Commission**

**TESTIMONY OF  
TERRY L. MURRAY  
ON BEHALF OF  
THE DIVISION OF RATEPAYER ADVOCATES**

**R.06-04-010**

**San Francisco, California  
May 3, 2007**

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EXHIBIT TLM-1: CURRICULUM VITAE OF TERRY L. MURRAY

1    **I.       INTRODUCTION AND QUALIFICATIONS**

2    **Q.       PLEASE STATE YOUR NAME, TITLE AND BUSINESS ADDRESS.**

3    A.       My name is Terry L. Murray. I am an independent consultant to the Division of  
4           Ratepayer Advocates (“DRA”). My business address is 8627 Thors Bay Road, El  
5           Cerrito, CA 94530.

6    **Q.       PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE AS**  
7           **THEY PERTAIN TO THIS PROCEEDING.**

8    A.       I am an economist specializing in analysis of regulated industries. I received an  
9           M.A. and an M.Phil. in Economics from Yale University and an A.B. in  
10          Economics from Oberlin College. At Yale, I was admitted to doctoral candidacy  
11          and completed all requirements for the Ph.D. except the dissertation. My fields of  
12          concentration at Yale were industrial organization (including an emphasis on  
13          regulatory and antitrust economics) and energy and environmental economics.

14               My professional background includes employment and consulting  
15          experience in the fields of energy, telecommunications and insurance regulation.  
16          As a consultant, I have testified or served as an expert on utility financial issues,  
17          including cost of capital, and/or demand-side management (“DSM”) incentives in  
18          proceedings before state regulatory commissions in Alaska, California, Colorado,  
19          the District of Columbia, Florida, Georgia, Hawaii, Illinois, Indiana, Maryland,  
20          Michigan, New York, Ohio, Texas, and Wisconsin, and before the Federal  
21          Communications Commission (“FCC”).

1           Before I became a consultant in 1990, I was employed in a variety of  
2           positions (including as a cost-of-capital analyst in DRA's predecessor, the Public  
3           Staff Division, and as Director of DRA) at the California Public Utilities  
4           Commission ("CPUC" or "Commission") for approximately six years and had  
5           significant responsibility for energy and utility financial matters. I have also  
6           taught economics and regulatory policy at both the undergraduate and graduate  
7           levels.

8           My curriculum vitae, which is appended as Exhibit TLM-1 to this  
9           testimony, provides more detail concerning my qualifications and experience.

10   **Q.   WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

11   A.   DRA has asked me to address "factual disputes concerning the appropriate shared  
12       savings rate(s) for the shareholder risk/return incentive mechanisms"<sup>1</sup> from the  
13       perspective of an expert on utility cost of capital issues. My testimony focuses on  
14       whether it is appropriate to use "foregone earnings from supply-side investments  
15       ('supply side comparability') as a benchmark for the shared savings rate"<sup>2</sup> and, if  
16       so, how supply-side comparability should be determined. I give particular  
17       attention to the questions of "whether the return-on-equity on supply-side  
18       investments should be adjusted to account for the potential earnings from  
19       alternative use of the funds"<sup>3</sup> and, if so, how the Commission can identify the

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<sup>1</sup> Rulemaking ("R.") 06-04-010, Assigned Commissioner's Ruling Revising the Phase 1 Determination on Hearings and Procedural Schedule and Notice of Phase 1 Evidentiary Hearing, March 26, 2007 (hereinafter, "3/26/07 ACR"), at 5.

<sup>2</sup> *Ibid.* at 3.

<sup>3</sup> *Ibid.*

1 appropriate alternative use of funds. I also briefly address “whether debt  
2 equivalence should be imputed for the purpose of calculating foregone earnings  
3 from supply-side earnings (under the supply-side comparability approach),”<sup>4</sup> but  
4 take no position on whether debt equivalence should be recognized in the  
5 authorized rate of return for purposes other than the shared-savings rate.<sup>5</sup> Finally,  
6 I offer some specific comments on the utility proposals for supply-side  
7 comparability, with particular emphasis on PG&E’s supply-side earnings  
8 foregone “SSEF” model.

9 **Q. PLEASE SUMMARIZE YOUR CONCLUSIONS.**

10 A. I conclude that:

- 11 • Supply-side comparability does not require inclusion of a “phantom” return on  
12 equity in the shared-savings rate for ratepayer-funded energy-efficiency  
13 (“EE”) programs;
- 14 • Any computation of supply-side comparability must recognize that the return  
15 on alternative investments of comparable risk should exactly counterbalance  
16 the “foregone earnings” on supply-side investments;

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<sup>4</sup> *Ibid.* at 4.

<sup>5</sup> In Decision (“D.”) 04-12-047, the Commission established that it would assess the debt equivalence of Purchased Power Agreements (“PPAs”) on a case-by-case basis. It reaffirmed this position in the most recent cost-of capital decision, “We have no reason to change, and no utility has requested that we change this method of considering debt equivalence.” (D.05-12-043, *mimeo*, at 8.) Therefore, my testimony addresses the application of debt equivalence in supply-side comparability calculations solely in relation to this rulemaking.

- 1 • There is no need to compensate the IOUs for the debt equivalence of
- 2 purchased-power agreements (“PPAs”) when determining supply-side
- 3 comparability; and
- 4 • If the Commission makes any use of PG&E’s “SSEF” model, it should adjust
- 5 that model to include a return for alternative uses of funds equal to each
- 6 utility’s most recent Commission-authorized return on equity and to exclude
- 7 any compensation for the debt equivalence of PPAs.

8 THE TESTIMONY THAT FOLLOWS EXPLAINS THE BASIS FOR EACH OF  
9 THESE CONCLUSIONS.

10 **II. SUPPLY-SIDE COMPARABILITY DOES NOT REQUIRE INCLUSION OF**  
11 **A PHANTOM RETURN IN THE SHARED SAVINGS RATE**

12 **Q. WHAT IS YOUR UNDERSTANDING OF THE CONCEPT OF “SUPPLY-**  
13 **SIDE COMPARABILITY” AS THAT TERM IS USED IN THE 3/26/07**  
14 **ACR?**

15 A. It is my understanding that the 3/26/07 ACR uses the term supply-side  
16 comparability to reference the concept that, because investor-owned utilities  
17 (“IOUs”) would have the opportunity to earn a return on investment in supply-  
18 side resources, they require a comparable earnings opportunity to be willing to  
19 pursue demand-side alternatives such as energy efficiency (“EE”).

20 **Q. IS THERE ANY BASIS IN FINANCIAL OR ECONOMIC THEORY FOR**  
21 **THE CONCEPT OF SUPPLY-SIDE COMPARABILITY, AS YOU HAVE**  
22 **JUST DEFINED THAT CONCEPT?**

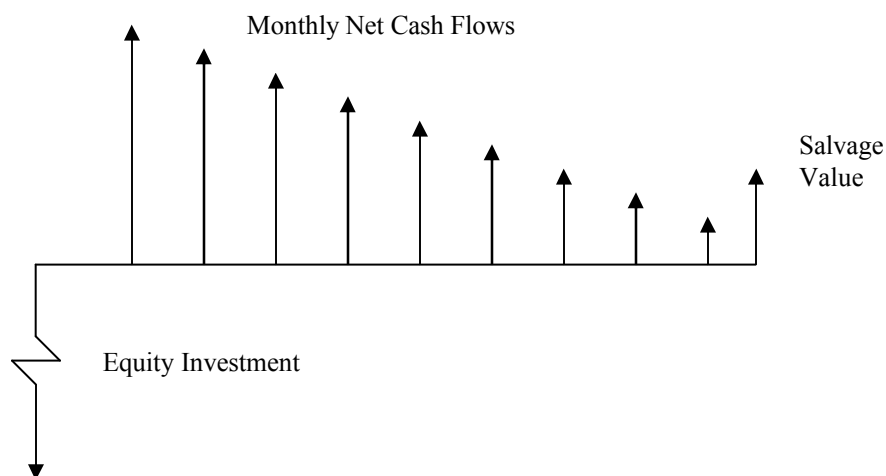
23 A. No. The concept of supply-side comparability that I have just defined lacks any  
24 foundation in financial or economic theory. *Ratepayer-funded EE programs*

*eliminate supply-side investments – and the risks associated with those investments. In principle, the CPUC sets the utilities’ authorized returns at levels just sufficient to compensate for the risks associated with their investments. Hence, true supply-side comparability is achieved for ratepayer-funded EE programs without including any markup for “foregone earnings” from supply-side investments because the amount of reward (in the form of “foregone earnings”) that is eliminated exactly balances the amount of risk that utility shareholders avoid by not having to invest in supply-side resources.*

**Q. PLEASE EXPLAIN IN MORE DETAIL HOW SHAREHOLDERS RECEIVE COMPENSATION FOR SUPPLY-SIDE INVESTMENTS.**

**A.** Cash-flow diagrams are a common tool used to illustrate investment options. A simplified diagram of a traditional power plant investment, viewed from the shareholder’s perspective, is:

**Figure 1 – Simplified Cash Flow Diagram of Supply-Side Investment**



1           The first downward-pointing line represents the lump-sum investment that  
2           utility shareholders provide to finance supply-side plant and equipment. The next  
3           series of upward-pointing lines represents the monthly revenues the IOU receives  
4           for power generated by the plant (net of operating expenses). The final upward-  
5           pointing line represents the salvage value of the plant and equipment (if any) at  
6           the time that the plant is retired from service and ceases to generate power (and  
7           therefore ceases to generate monthly cash flows).

8           In this simplified diagram, the monthly net cash flows represent a  
9           perfectly predictable stream of earnings that is exactly adequate to compensate  
10          utility shareholders for the time-value of the money that they have provided for  
11          the supply-side investment, but that is being returned to them over time through  
12          the depreciation allowance included in rates (and the final net salvage value of the  
13          plant<sup>6</sup>). Shareholders require compensation for the time-value of money because  
14          they lose the opportunity to make alternative investments (or to consume goods  
15          and services) until their investment dollars are returned to them through  
16          depreciation allowances.

17          Depreciation is calculated in nominal dollars (dollars that are not adjusted  
18          for inflation) in such a way that the depreciation allowances over time exactly  
19          equal the total shareholder investment allowed into rate base. This approach to  
20          depreciation creates a potential problem for shareholders because inflation erodes  
21          the purchasing power of the depreciation allowances used to return investment to

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<sup>6</sup> Net salvage may be positive or negative. To simplify this analysis further, one can disregard the net salvage cash flow.



1       them. The standard ratemaking solution to this problem is to establish a nominal,  
2       rather than real, return on equity. Thus, the return on equity includes an inflation  
3       component designed to compensate shareholders for the devaluation of the  
4       depreciation payments over time.

5       **Q.     DO UTILITY SHAREHOLDERS REQUIRE COMPENSATION FOR THE**  
6       **TIME-VALUE OF MONEY OR FOR THE EFFECTS OF INFLATION ON**  
7       **NOMINAL-DOLLAR DEPRECIATION ALLOWANCES WHEN**  
8       **RATEPAYER-FUNDED EE PROGRAMS SUBSTITUTE FOR**  
9       **SHAREHOLDER-FUNDED SUPPLY-SIDE RESOURCES?**

10      **A.**    No. Utility shareholders make no investment in ratepayer-funded EE programs.  
11       They are never denied the use of their investment dollars and thus have no need to  
12       be compensated for either the time-value of money or the effects of inflation on  
13       the nominal dollars used to return investments to shareholders over time through  
14       depreciation allowances. Because the authorized return on equity on supply-side  
15       investments includes compensation for both the time-value of money and the  
16       effects of inflation, use of the authorized return on equity to establish supply-side  
17       comparability significantly overstates the extent to which shareholders are  
18       foregoing earnings as a result of ratepayer-funded EE programs.

19      **Q.     HOW COULD THE CPUC QUANTIFY THE TIME-VALUE OF MONEY**  
20       **AND THE INFLATION COMPONENT OF THE AUTHORIZED RETURN**  
21       **ON EQUITY?**

1 A. The combination of the time-value of money and the inflation component of the  
2 authorized return can be approximated by the return of a risk-free asset with an  
3 investment horizon (or “term”) similar to the duration of the investment in supply-  
4 side resources. The most commonly used measure of the risk-free return is the  
5 return on Treasury bonds of comparable term. Thus, *at a minimum*, use of the  
6 authorized return on equity as a basis for assessing supply-side comparability is  
7 overstated by an amount equal to the yield on long-term Treasury bonds.

8 **Q. WOULD SUBTRACTING THE YIELD ON LONG-TERM TREASURY**  
9 **BONDS FROM THE AUTHORIZED RETURN ON EQUITY PRODUCE**  
10 **TRUE EQUIVALENCE BETWEEN THE FOREGONE EARNINGS ON**  
11 **SUPPLY-SIDE INVESTMENTS AND THE SHAREHOLDER OUTCOMES**  
12 **ASSOCIATED WITH RATEPAYER-FUNDED EE PROGRAMS?**

13 A. No. In the real world, utility shareholders not only give up the alternative uses of  
14 their investment dollars over the lifetime of the supply-side resource, they also  
15 bear the risk of an unpredictable stream of earnings on that investment. Sales  
16 may be lower than forecast, or expenses may be higher. In either case, the  
17 monthly net cash flow available after expenses may be positive, but too small to  
18 repay the initial investment (by covering the depreciation allowance) and to make  
19 required payments on any debt financing<sup>7</sup> plus generate a return on that  
20 investment. At times, monthly net cash flow may even be negative. The CPUC  
21 has removed the first kind of risk (sales forecast risk) through its ERAM

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<sup>7</sup> Because payments on debt take precedence over returns to shareholders, higher percentages of debt financing (*i.e.*, higher “leverage”) increases the financial risk to shareholders and, all other things being equal, necessitate a higher percentage return on equity.

1 adjustment, but California IOUs remain subject to the second kind of risk  
2 (expense risk).

3 California IOUs also bear an additional form of risk for supply-side  
4 investments, namely, the risk that the Commission will deem some or all of the  
5 original shareholder investment to be imprudent. In this case, subsequent  
6 ratemaking is designed to allow the IOU to recover the time-value of the  
7 prudently incurred investment, together with a risk-adjusted return, but does not  
8 provide a stream of cash flow to balance out the imprudent portion of the  
9 investment.

10 The authorized return on equity is designed to compensate utility  
11 shareholders for bearing all of these risks. In theory, the authorized return on  
12 equity is set so that risk and return are precisely in balance: in other words,  
13 shareholders can expect (but are not guaranteed) a return on their equity  
14 investment that is just exactly enough to compensate them for the risks associated  
15 with that investment.

16 Thus, the upward and downward lines in the simplified cash flow diagram  
17 in Figure 1 can also be interpreted using an analogy of scales or balances. When  
18 utility shareholders provide the initial funds for a supply-side investment, one side  
19 of the scale dips down to reflect those investment dollars (and all associated costs  
20 to shareholders). Regulators then add offsetting weights to the opposite side of  
21 the scales through the return on equity component incorporated in monthly rates  
22 to compensate shareholders for (1) the time-value of the invested funds (*i.e.*, to  
23 compensate shareholders for not having the use of some or all of their funds over

1 the life of the plant), (2) the devaluation of the nominal dollars used to return  
2 investments to shareholders through depreciation allowances, and (3) the risk  
3 created by the uncertainty of the cash flows that the investment will produce.

4 When ratepayers fund EE programs that substitute for potential supply-  
5 side investments, *all* of the weight on the “shareholder cost” side of the scales is  
6 lifted. Thus, supply-side comparability can only be achieved by eliminating *all* of  
7 the offsetting weights on the “shareholder compensation” side of the scale.

8 Subtracting the risk-free rate (the yield on long-term Treasury bonds) would  
9 remove the offsetting weights for the time-value of money and inflation  
10 components of the authorized return on equity, but would leave the portion of that  
11 return necessary to compensate shareholders for the risks associated with supply-  
12 side investments. Because ratepayer-funded EE programs eliminate those  
13 shareholder risks as well, the Commission must eliminate the entire authorized  
14 return on equity to restore the scales to an equal balance between shareholder  
15 costs and shareholder benefits.

16 **Q. WHAT CONCLUSION DO YOU DRAW CONCERNING THE NEED, IF**  
17 **ANY, TO INCLUDE A “PHANTOM RETURN” IN THE SHARED-**  
18 **SAVINGS RATE SO THAT SHAREHOLDERS WILL ACHIEVE**  
19 **SUPPLY-SIDE COMPARABILITY OF EARNINGS?**

20 **A.** For all of the reasons discussed above, I conclude that supply-side comparability  
21 does not require the inclusion of a phantom return in the shared-savings rate.  
22 Removing an equal amount of risk and reward (by removing both the risk of  
23 supply-side investments and the authorized return on equity that is the “reward”

1 for incurring those risks) leaves the risk/reward scales in exactly the same balance  
2 as exists for supply-side investments.

3 **Q. DRA'S PROPOSAL INCLUDES MANAGERIAL INCENTIVE BONUSES**  
4 **FOR SUCCESSFUL IMPLEMENTATION OF RATEPAYER-FUNDED EE**  
5 **PROGRAMS. WHAT EFFECT WOULD THIS PROPOSAL HAVE ON**  
6 **THE RELATIVE INCENTIVES FOR IOUS TO PURSUE EE**  
7 **OPPORTUNITIES?**

8 A. As I have just explained, supply-side comparability exists when IOUs receive *no*  
9 compensation for foregone earnings. DRA's proposal provides IOUs an  
10 opportunity to achieve more favorable outcomes than would exist if shareholders  
11 invested in supply-side resources and earned the authorized return on equity.  
12 Therefore, DRA's proposal would make energy efficiency a clearly preferred  
13 resource.

14 **III. ANY COMPUTATION OF SUPPLY-SIDE COMPARABILITY MUST**  
15 **RECOGNIZE THAT THE RETURN ON ALTERNATIVE INVESTMENTS**  
16 **OF COMPARABLE RISK SHOULD EXACTLY COUNTERBALANCE**  
17 **THE FOREGONE EARNINGS ON SUPPLY-SIDE INVESTMENTS.**

18 **Q. ASSUME FOR THE SAKE OF ARGUMENT THAT THE COMMISSION**  
19 **WISHES TO PERFORM AN EXPLICIT CALCULATION OF SUPPLY-**  
20 **SIDE COMPARABILITY FOR RATEPAYER-FUNDED EE PROGRAMS.**  
21 **IS IT APPROPRIATE TO INCLUDE AN OFFSET FOR THE RETURNS**  
22 **THAT UTILITY SHAREHOLDERS COULD EARN ON ALTERNATIVE**  
23 **INVESTMENTS?**

1     A.     Absolutely. Ratepayer-funded EE programs free shareholder dollars for  
2           alternative investments. Failure to consider the expected returns on these  
3           alternative investments would enable shareholders to earn a higher return than is  
4           necessary to compensate them for the risks that they bear.

5     **Q.     HOW SHOULD THE COMMISSION DETERMINE THE APPROPRIATE**  
6           **RETURN FOR ALTERNATIVE INVESTMENTS TO INCLUDE AS AN**  
7           **OFFSET IN A SUPPLY-SIDE COMPARABILITY APPROACH?**

8     A.     Shareholders may choose to invest their freed-up funds in ways that entail more,  
9           less or the same risk as the risk of utility supply-side investments. Financial and  
10          economic theory dictate, however, that on a risk-adjusted basis, shareholders  
11          should perceive these returns to be equivalent. That is, shareholders will choose  
12          riskier alternatives to investing in utility supply-side resources only if the higher  
13          expected returns are sufficient to compensate them for the increased risk.  
14          Similarly, they will accept lower expected returns than could be expected from  
15          investments in utility supply-side resources only if the lower risk offsets the  
16          reduced return.

17                 This principle of equivalence of risk-adjusted returns greatly simplifies the  
18          Commission's task in determining the appropriate return for alternative  
19          investments to include as an offset in a supply-side comparability approach. The  
20          benchmark return should be the return that utility shareholders would expect to  
21          earn on an investment of comparable risk to an investment in supply-side  
22          resources. Note that this is exactly the standard that the Commission uses to  
23          determine the authorized return on equity for the IOUs. In D.05-12-043, the

1 most recent cost of capital decision, the Commission stated that a fair return  
2 should “be equal to that generally being made at the same time and in the same  
3 general part of the country on investments in other business undertakings attended  
4 by corresponding risks and uncertainties.”<sup>8</sup> The Commission further stated that  
5 the return on equity “should also be commensurate with returns available on  
6 alternative investments of comparable risks.”<sup>9</sup> *By definition, therefore, the*  
7 *appropriate return for alternative investments is exactly equal to the*  
8 *Commission-authorized return on equity for each IOU.*

9 To be consistent with its own logic in determining the utilities’ authorized  
10 return on equity, the Commission must presume that utility shareholders would be  
11 able to earn the authorized return on equity if they were to use the dollars not  
12 invested in supply-side plant and equipment to fund an investment of comparable  
13 risk. *Any other assumption is tantamount to a finding by this Commission that*  
14 *it erred in determining the risk-adjusted return for each utility.*

15 **IV. THERE IS NO NEED TO COMPENSATE THE IOUS FOR THE DEBT**  
16 **EQUIVALENCE OF PURCHASED POWER AGREEMENTS WHEN**  
17 **DETERMINING SUPPLY-SIDE COMPARABILITY.**

18 **Q. ONE OF THE FACTUAL DISPUTES REFERENCED IN THE 3/26/07 ACR**  
19 **IS THE QUESTION OF WHETHER DEBT EQUIVALENCE OF PPAS**  
20 **SHOULD BE REFLECTED IN ANY CALCULATION OF FOREGONE**  
21 **EARNINGS UNDER THE SUPPLY-SIDE COMPARABILITY**  
22 **APPROACH. IS THERE ANY REASON FOR THE COMMISSION TO**

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<sup>8</sup> D.05-12-043, *mimeo*, at 16.

<sup>9</sup> *Ibid.*

**1 COMPENSATE THE IOUS FOR THE DEBT-EQUIVALENCE OF PPAS**  
**2 WHEN PERFORMING AN EXPLICIT CALCULATION OF SUPPLY-**  
**3 SIDE COMPARABILITY?**

4 A. No. This is yet another example in which risk and reward can – and should – be  
5 removed in equal measure when determining supply-side comparability. In  
6 theory, debt-equivalence due to long-term PPAs can lower an IOU’s credit rating  
7 and thereby raise its cost of debt. Ratepayer-funded EE programs allow utilities  
8 to avoid PPAs and hence to avoid any costs (*i.e.*, financial “risks”) associated with  
9 the debt-equivalence of PPAs. Hence, regardless of whether one believes that  
10 IOUs should be compensated for the debt-equivalence of PPAs in setting the  
11 authorized return for shareholder investments in supply-side resources, there is  
12 absolutely no reason to include such compensation in the shared-savings rate.  
13 Quite to the contrary, holding all else constant, ratepayer-funded EE programs  
14 benefit utility shareholders by reducing their exposure to PPAs and any debt-  
15 equivalence thereof. Thus, if anything, the Commission should consider *reducing*  
16 the shared-savings rate to reflect this shareholder benefit.

**17 V. SPECIFIC COMMENTS ON PG&E’S “SSEF” MODEL**

**18 Q. PG&E HAS DEVELOPED A MODEL TO CALCULATE THE**  
**19 INCENTIVES ALLEGEDLY NEEDED TO ESTABLISH SUPPLY-SIDE**  
**20 COMPARABILITY FOR RATEPAYER-FUNDED EE PROGRAMS.**  
**21 HAVE YOU REVIEWED THAT MODEL?**

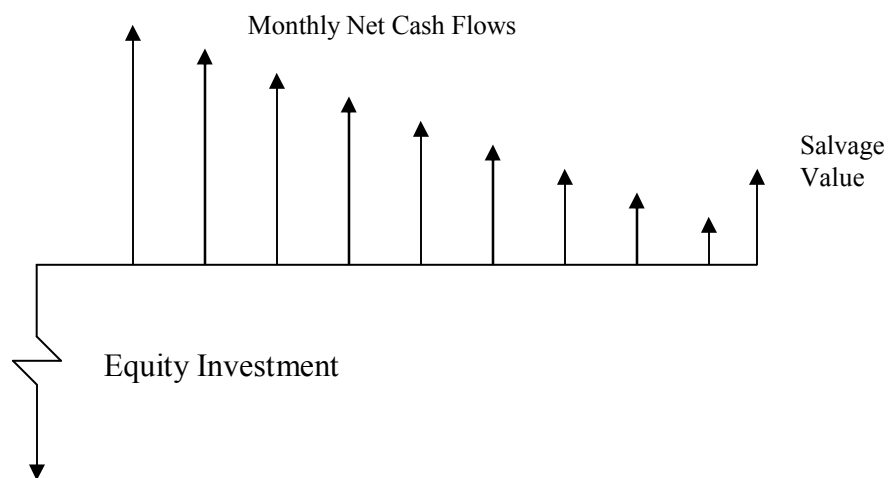
22 A. Yes.



1    **Q.    IN YOUR OPINION AS AN EXPERT ON COST OF CAPITAL, DOES**  
2    **PG&E’S MODEL CORRECTLY CALCULATE SUPPLY-SIDE**  
3    **EQUIVALENCE?**

4    A.    No. Recall from Section II above that a supply side investment can be illustrated  
5    with the following cash flow diagram:

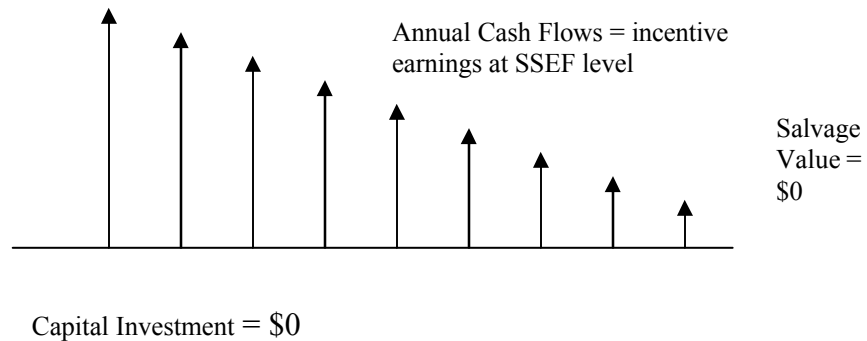
6    **Figure 1 – Simplified Cash Flow Diagram of Supply-Side Investment**



7  
8        By contrast, PG&E (and the other IOUs) advocate an approach to “supply-  
9    side comparability” for ratepayer-funded EE programs that takes the following  
10   form:

11

**Figure 2 –Cash Flow Diagram of Utility SSEF Incentive Proposal**

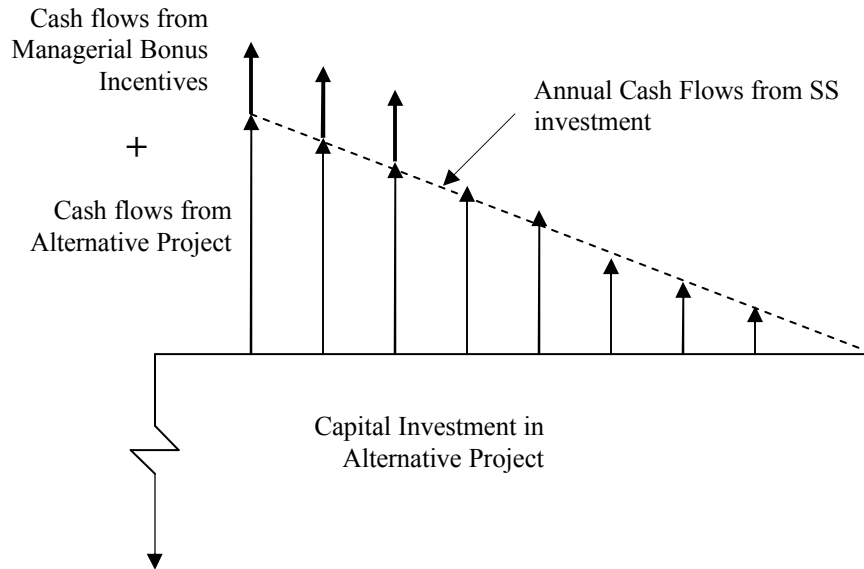


PG&E and the other IOUs seek annual cash flows equivalent to the monthly cash flows of the supply-side investment without any capital investment or risk, a situation that would yield an infinite rate of return! Thus, the IOU incentive proposals for ratepayer-funded EE programs are in no way “comparable” to the circumstances applicable to shareholder supply-side investments.

**Q. IS IT POSSIBLE TO USE A MODEL SUCH AS PG&E’S TO DETERMINE TRUE SUPPLY-SIDE COMPARABILITY?**

A. Yes, although doing so is needlessly complex. I agree with TURN that supply-side comparability must recognize that funds the IOUs would either have to raise in capital markets or take from retained earnings are available for alternative investments. Therefore, true supply-side comparability can be illustrated with the following cash-flow diagram:

**Figure 3 –Cash Flow Diagram of SSEF with Alternative Use of Funds**



To achieve supply-side comparability, utility shareholders must achieve the same balance of risk and reward from ratepayer-funded DSM that they would receive from supply-side investments. As I explained in Section IV above, by definition, that balance of risk and reward exists without any incentive payments whatsoever. Indeed, as the cash-flow diagram in Figure 3 illustrates, even the incentives that DRA proposes make energy efficiency a preferred resource from the perspective of utility shareholders because they can achieve supply-side comparability without any incentives whatsoever simply via the cash flows from alternative investments.

**Q. ARE THERE ANY SPECIFIC ADJUSTMENTS TO PG&E'S SSEF MODEL THAT WOULD PERMIT A MORE ACCURATE COMPUTATION OF SUPPLY-SIDE COMPARABILITY?**

1     A.     Yes. As is illustrated above, the primary adjustment to SSEF models involves the  
2           alternative use of funds that is possible through ratepayer-funded EE programs.  
3           Calculation of accurate incentive levels using this approach requires: (1) an  
4           accurate SSEF model; and (2) accurate application of the alternative use of funds  
5           rate.

6                     PG&E's SSEF model is designed to reflect the circumstances of an  
7           electric utility where supply-side investment encompasses both generation and  
8           transmission and distribution ("T&D"). Without conceding the accuracy of  
9           PG&E's model in any other respects,<sup>10</sup> I focus here on adjustments to the SSEF  
10          model attached to PG&E's March 28, 2007 comments in this proceeding  
11          necessary to address the issue of the alternative use of funds.

12    **Q.     WHAT SPECIFIC ADJUSTMENT WOULD YOU PROPOSE TO**  
13           **CAPTURE THE CORRECT ALTERNATIVE USE OF FUNDS,**  
14           **EXPRESSED AS A PERCENTAGE RETURN?**

15    A.     For the purpose of determining supply-side comparability using PG&E's model, I  
16           recommend that Commission should use the most recent CPUC-authorized return  
17           on equity for each of the IOUs as the alternative use of funds rate. My  
18           recommendation does not reflect or depend on any independent assessment of the  
19           accuracy of the CPUC-authorized return. Rather, as I explained in Section III  
20           above, to be consistent with its own logic in determining the utilities' authorized

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<sup>10</sup> DRA's policy witness, Thomas C. Roberts, discusses modeling issues related to gas utilities in his concurrently filed report. Mr. Roberts also addresses other methodological disputes between DRA and PG&E, including a disagreement regarding how PG&E discounts annual foregone earnings to present value and another issue that may inflate PG&E's calculated SSEF by over 25%.

1 return on equity, the Commission must presume that utility shareholders would be  
2 able to earn the authorized return on equity if they were to use the dollars not  
3 invested in supply-side plant and equipment to fund an investment of comparable  
4 risk. Any other assumption is tantamount to a finding by this Commission that it  
5 erred in determining the risk-adjusted return for each utility.

6 **Q. DO YOU RECOMMEND ANY OTHER SPECIFIC ADJUSTMENT TO**  
7 **PG&E'S MODEL?**

8 A. Yes. The Commission should eliminate the calculation for the debt equivalence  
9 of PPAs for the reasons that I discussed in Section IV above.

10 **Q. DOES THAT CONCLUDE YOUR TESTIMONY AT THIS TIME?**

11 A. Yes, it does.

**EXHIBIT TLM-1**  
**CURRICULUM VITAE OF TERRY L. MURRAY**

## **Terry L. Murray**

### **CONTACT INFORMATION**

8627 Thors Bay Road  
El Cerrito, CA 94530  
Phone: (510) 215-2860  
eFax: (208) 988-0296

### **EMPLOYMENT**

#### **Independent consultant**

**January 2007 – present**

General litigation support as well as expert witness testimony relating to regulatory and antitrust matters.

#### **President, Murray & Cratty, LLC**

**January 1998 - present**

Economic consulting and expert witness testimony specializing in regulatory and antitrust matters.

#### **Principal, Murray and Associates**

**April 1992 - December 1997**

Economic consulting and expert witness testimony, primarily in the fields of telecommunications, energy and insurance regulation and antitrust.

#### **Director, Regulatory Economics, Morse, Richard, Weisenmiller & Associates, Inc.**

**April 1990 - April 1992**

Economic consulting and expert witness testimony, primarily in the fields of telecommunications and energy regulation.

#### **California Public Utilities Commission**

**June 1984 - March 1990**

#### **Director, Division of Ratepayer Advocates (DRA)**

**March 1989 - March 1990**

Headed a staff of over 200 analysts who provided expert witness testimony on behalf of California ratepayers in contested proceedings involving telecommunications, electric, gas, water and transportation utilities. Major proceedings included evaluation of proposed merger between Southern California Edison and San Diego Gas and Electric Companies.

#### **Program Manager, Energy Rate Design and Economics Branch, DRA**

**October 1987 - March 1989**

Managed a staff of over 30 analysts who testified on electric and gas rate design and costing issues, sales forecasts and productivity analyses. Testified as lead policy witness in electric utility incentive ratemaking and transportation policy proceedings.

#### **Senior Policy Analyst, Policy and Planning Division**

**March 1987 - October 1987**

Organized en banc hearing and drafted notice of investigation for major telecommunications incentive regulation proceeding. Headed Commission task force on open network architecture.

**Commissioner's Advisor****July 1985 - March 1987**

Lead advisor on independent power industry and cost of capital issues. Analyzed proposed decisions on energy, telecommunications, water and transportation issues and made recommendations for Commission action. Co-authored Commission order establishing conditions for approval of San Diego Gas and Electric Company application to form a holding company.

**Staff Economist, Public Staff Division****June 1984 - July 1985**

Testified on cost of capital and telecommunications bypass issues. Served on telecommunications strategy task force charged with developing recommendations for post-divestiture regulatory policies.

**Instructor, Golden Gate University****1986 - 1987**

Taught courses on telecommunications regulation to students in the Masters in Telecommunications Management program and students in a special program for federal government telecommunications managers.

**Acting Assistant Professor of Economics, Wesleyan University****July 1981 - June 1982**

Taught undergraduate courses in microeconomics, macroeconomics, econometrics, and economics and policy of regulation.

**TESTIMONY****Alaska, Regulatory Commission of**

- Docket No. U-01-83, In the Matter of the Investigation of the Local Exchange Revenue-Requirement, Depreciation, Cost-of-Service, and Rate Design Studies Filed by ACS of Fairbanks, Inc. d/b/a Alaska Communications Systems, ACS Local Service, and ACS, et al., 11/3/03.
- Docket No. U-96-89, In the Matter of the Petition by GCI Communications Corp. d/b/a General Communication, Inc. and GCI for Arbitration Under Section 252 of the Communications Act of 1996 with the Municipality of Anchorage d/b/a ATU Telecommunications a/k/a ATU Telecommunications for the Purpose of Instituting Local Competition, 8/29/03, 9/29/03, 10/13/03.

**California Department of Insurance**

- File Nos. PA-94-0012-00 & PA-94-0012-0A, In re 20th Century Insurance Company and 21st Century Casualty Company.
- File Nos. PA-93-0014-00 et al., In the Matter of the Rates and Rating Practices, and Rate Applications of: State Farm Mutual Automobile Insurance Company, State Farm Fire and Casualty Company, State Farm General Insurance Company, Applicants and Respondents, 3/1/94, 3/29/94.
- File Nos. PA-93-0009-00 et al., In the Matter of the Rate Applications of Nationwide Mutual Insurance Company, Nationwide Mutual Fire Insurance Company, Nationwide Property and Casualty Insurance Company, Applicants, 9/11/93.



### California Public Utilities Commission

- C.05-11-011, Utility Consumers' Action Network, Complainant, vs. AT&T California, dba Pacific Bell Telephone Company (U-1001-C), Defendant, 6/30/06.
- A.05-03-005, In the Matter of the Application of SBC-California (U 1001 C) for a Surcharge and a Balancing Account to Recover Undergrounding Costs in the City of San Diego, 4/14/06.
- R.05-04-005, Order Instituting Rulemaking on the Commission's Own Motion to Assess and Revise the Regulation of Telecommunications Utilities, 1/13/06.
- A.05-04-020, In the Matter of the Joint Application of Verizon Communications Inc. ("Verizon") and MCI, Inc. ("MCI") to Transfer Control of MCI's California Utility Subsidiaries to Verizon, Which Will Occur Indirectly as a Result of Verizon's Acquisition of MCI, 8/15/05.
- A.05-02-027, In the Matter of the Joint Application of SBC Communications Inc. ("SBC") and AT&T Corp. ("AT&T") for Authorization to Transfer Control of AT&T Communications of California (U-5002), TCG Los Angeles, Inc. (U-5462), TCG San Diego (U-5389), and TCG San Francisco (U-5454) to SBC, Which Will Occur Indirectly as a Result of AT&T's Merger With a Wholly-Owned Subsidiary of SBC, Tau Merger Sub Corporation, 6/24/05.
- R. 03-08-018, Order Instituting Rulemaking to Review Policies Concerning Intrastate Carrier Access Charges, 2/14/05, 3/21/05.
- Case No. 02-09-045, Mpower Communications Corp. (U-5859-C), Complainant, v. Pacific Bell Telephone Company (U-1001-C), Defendant, 5/23/03, 6/4/03.
- R.01-09-001/ I.01-09-002, Orders Instituting Rulemaking/Investigation on the Commission's Own Motion to Assess and Revise the New Regulatory Framework for Pacific Bell and Verizon California Incorporated, 6/21/02, 7/19/02.
- R.93-04-003/I.93-04-002, Rulemaking and Investigation on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish and Framework for Network Architecture Development of Dominant Carrier Networks, and R. 95-04-043/I.95-04-044, Rulemaking and Investigation on the Commission's Own Motion into Competition for Local Exchange Service (consolidated for purposes of evaluating Pacific Bell's Section 271 application), 8/23/01.
- A.01-02-024, Joint Application of AT&T Communications of California, Inc. (U 5002 C) and WorldCom, Inc. for the Commission to Reexamine the Recurring Costs and Prices of Unbundled Switching in Its First Annual Review of Unbundled Network Element Costs Pursuant to Ordering Paragraph 11 of D.99-11-050, and A.01-02-035, Application of AT&T Communications of California, Inc. (U 5002 C) and WorldCom, Inc. for the Commission to Reexamine the Recurring Costs and Prices of Unbundled Loops in Its First Annual Review of Unbundled Network Element Costs Pursuant to Ordering Paragraph 11 of D.99-11-050, 2/21/01, 2/28/01, 8/20/01, 10/30/01, 11/9/02, 2/28/02, 10/18/02, 2/7/03, 3/12/03.
- A.01-01-010, Application by Pacific Bell Telephone Company (U 1001 C) for Arbitration of an Interconnection Agreement with MCImetro Access Transmission Services, L.L.C. (U 5253 C) Pursuant to Section 252(b) of the Telecommunications Act of 1996,. 2/2/01.

- A.00-01-022, Application of AT&T Communications of California, Inc., et al., for Arbitration of an Interconnection Agreement with Pacific Bell Pursuant to Section 252(b) of the Telecommunications Act of 1996, 1/24/00, 3/5/00.
- A.00-01-012, In the Matter of Covad Communications Company's (U 5752 C) Petition for Arbitration of Interconnection Agreement with Roseville Telephone Company (U 1015 C), 1/7/00.
- A.98-12-005, In the Matter of the Joint Application of GTE Corporation ("GTE") and Bell Atlantic Corporation ("Bell Atlantic") to Transfer Control of GTE's California Utility Subsidiaries to Bell Atlantic Which Will Occur Indirectly as a Result of GTE's Merger with Bell Atlantic, 6/7/99.
- A.99-03-047, In the Matter of the Petition by Pacific Bell (U 1001 C) for Arbitration of an Interconnection Agreement with Metropolitan Fiber Systems/ Worldcom Technologies, Inc. (MFS/Worldcom) Pursuant to Section 252(b) of the Telecommunications Act of 1996, 4/16/99, 5/24/99.
- A.98-05-038, In the Matter of the Application of Pacific Bell for Authority for Pricing Flexibility and to Increase Certain Operator Services, to Reduce the Number of Monthly Directory Assistance Call Allowances, and Adjust Prices for Four Centrex Optional Features, 11/17/98.
- A.98-06-052, In the Matter of the Petition of PDO Communications, Inc. for Arbitration Pursuant to Section 252 of the Federal Telecommunications Act of 1996 to Establish an Interconnection Agreement with Pacific Bell, 8/14/98.
- In the Matter of the Petition of MCImetro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996 (re: GTE California, Inc.), 9/96.
- A.96-04-038, In the Matter of the Joint Application of Pacific Telesis Group and SBC Communications, Inc. for SBC to Control Pacific Bell, 9/30/96.
- A.93-03-054, Application to Modify Diablo Canyon Pricing and Adopt a Customer Electric Rate Freeze in Compliance with Decision 95-12-063, 9/9/96.
- R.93-04-003/I.93-04-002, Rulemaking and Investigation on the Commission's Own Motion to Govern Open Access to Bottleneck Services and Establish and Framework for Network Architecture Development of Dominant Carrier Networks, 6/14/96, 7/10/96, 3/18/97, 12/19/97, 2/11/98, 4/8/98, 4/27/98, 5/1/98, 6/5/98, 12/18/98, 1/11/99, 2/8/99, 3/15/00, 3/27/00, 4/5/00, 5/2/00, 6/11/01, 6/25/01, 7/24/01, 7/30/02, 8/20/02, 9/9/02, 11/3/03, 8/6/04, 11/9/04, 1/28/05, 4/1/05.
- I.95-04-044, Order Instituting Investigation on the Commission's Own Motion into Competition for Local Exchange Service, 10/2/95, 10/9/95, 12/95, 12/12/03, 1/16/04, 2/9/04, 2/18/04.
- I.94-04-032, Order Instituting Investigation on the Commission's Proposed Policies Governing Restructuring California's Electric Services Industry and Reforming Regulation, 12/8/94.
- Application Nos. 93-05-008 et al., In the Matter of the Application of Sierra Pacific Power Company to Authorize a Return on Equity for Calendar Year 1994 Pursuant to Attrition Rate Adjustment Mechanism, 8/93.

- Application Nos. 92-05-002 and 92-05-004, Application of GTE California Incorporated for Review of the Operations of the Incentive-Based Regulatory Framework Adopted in Decision 89-10-031, 5/93, 7/93.
- Case No. 91-12-028, The City of Long Beach, in its Proprietary Capacity and as Trustee for the State of California, Complainant, vs. Unocal California Pipeline Company, a Unocal Company, Defendant, 5/15/93.
- I.87-11-033 et al., In the Matter of Alternative Regulatory Frameworks for Local Exchange Carriers (Phase III, Implementation and Rate Design), 9/23/91, 12/16/91, 1/17/92.
- General freight deregulation proceeding, 10/88.
- I.86-10-001, Risk, Return and Ratemaking, 3/88.
- Southwest Gas General Rate Case, 8/85.
- Application No. 85-01-034, Pacific Bell Test Year 1986 General Rate Case, 4/22/85.
- CP National South Lake Tahoe Gas General Rate Case, 12/84.

#### **Colorado Public Service Commission**

- Docket No. 91A-480EG, In the Matter of the Joint Application of the Parties to Revised Settlement Agreement II in Docket Nos. 91S-091EG and 90F-226E for Commission Consideration of Decoupling Revenues from Sales and Establishment of Regulatory Incentives to Encourage the Implementation of DSM Programs, 11/8/91, 4/30/92, 9/8/92, 9/14/92.

#### **Connecticut Department of Public Utility Control**

- In the Matter of the Petition of MCImetro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996 (with The Southern New England Telephone Company), 12/96.
- Docket Nos. 95-06-17 et al., Application of The Southern New England Telephone Company for Approval to Offer Unbundled Loops, Ports and Associated Interconnection Arrangements, 9/8/95.

#### **Delaware Public Service Commission**

- Docket No. 96-324, Bell Atlantic - Delaware Statement of Terms and Conditions Under Section 252(F) of the Telecommunications Act of 1996, 2/4/97.
- Docket No. 45, In the Matter of the Development of Regulations for the Facilitation of Competitive Entry into the Telecommunications Local Exchange Service Market, 7/3/96.

#### **District of Columbia Public Service Commission**

- Formal Case No. 962, In the Matter of the Implementation of the District of Columbia Telecommunications Act of 1996 and Implementation of the Telecommunications Act of 1996, 3/24/97, 5/2/97, 5/9/97, 1/11/02.

#### **Federal Communications Commission**

- WC Docket No. 04-313, In the Matter of Unbundled Access to Network Elements, 10/4/04, 10/19/04.

- WC Docket No. 03-173, In the Matter of Review of the Commission's Rules Regarding the Pricing of Unbundled Network Elements and the Resale of Service by Incumbent Local Exchange Carriers, 12/16/03, 1/30/04.
- WC Docket No. 02-306, In the Matter of Application by SBC Communications Inc., Pacific Bell Telephone Company, and Southwestern Bell Communications Services, Inc. for Provision of In-Region, InterLATA Services in California, 10/9/02.
- CC Docket No. 01-338, In the Matter of Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers, 7/17/02.
- File No. EB-02-MD-017, WorldCom, Inc., Complainant, v. Verizon New England Inc., Bell Atlantic Communications, Inc. (d/b/a Verizon Long Distance), NYNEX Long Distance Company (d/b/a Verizon Enterprise Solutions), and Verizon Global Networks, Inc., Defendants, 5/7/02.
- CC Docket Nos. 00-218, 00-249 and 00-251, In the Matter of the Petition of WorldCom, Inc., Pursuant to Section 252(e)(5) of the Communications Act for Expedited Preemption of the Jurisdiction of the Virginia State Corporation Commission Regarding Interconnection Disputes with Verizon Virginia, Inc., and for Expedited Arbitration, et al., 7/31/01, 8/27/01, 9/21/01, 10/28/03.
- File No. E-98-12, MCI Telecommunications Corp. and MCImetro Access Transmission Services, Inc., Complainants, v. Bell Atlantic Corp., Defendant, 12/19/97, 3/25/98.
- CC Docket No. 94-1, In the Matter of Price Cap Performance Review for Local Exchange Carriers, 6/29/94.
- W-P-C 6913 et al., In re the Matter of the Application of Pacific Bell for Authority Pursuant to Section 214 of the Communications Act of 1934, and Section 63.01 of the Commission's Rules and Regulations to Construct and Maintain Advanced Telecommunications Facilities to Provide Video Dialtone Services to Selected Communities.

#### **Florida Public Service Commission**

- Docket Nos. 981834-TP and 990321-TP, In re: Petition of competitive carriers for Commission action to support local competition in BellSouth Telecommunications, Inc.'s service territory and Petition of ACI Corp. d/b/a Accelerated Connections, Inc. for generic investigation to ensure that BellSouth Telecommunications, Inc., Sprint-Florida, Incorporated, and GTE Florida Incorporated comply with obligation to provide alternative local exchange carriers with flexible, timely, and cost-efficient physical collocation, 9/25/03.
- Docket No. 990649-TP, In re: Investigation into the Pricing of Unbundled Network Elements, 8/11/99, 9/10/99, 10/15/99, 6/8/00, 7/31/00, 8/28/00.
- Docket No. 930424-EI, In re: Request for Approval of Proposal for Incentive Return on Demand-Side Management Investments by Florida Power Corporation, 11/22/93.
- Docket No. 93-444-EI, In re: Request for Approval of Proposal for Revenue Decoupling by Florida Power Corporation, 11/22/93.

### **Georgia Public Service Commission**

- Docket No. 14361-U, In re: Generic Proceeding to Review Cost Studies, Methodologies, Pricing Policies and Cost Based Rates for Interconnection and Unbundling of BellSouth Telecommunications, Inc.'s Network, 4/5/02, 7/26/04, 12/1/04.
- Docket No. 11900-U, In re: Investigation of BellSouth Telecommunications, Inc.'s Provision of Unbundled Network Elements for xDSL Service Providers, 11/13/00, 12/20/00.

### **Hawaii Public Service Commission**

- Docket No. 7702, In the Matter of Public Utilities Commission Instituting a Proceeding on Communications, Including an Investigation of the Communications Infrastructure of the State of Hawaii, 7/3/97, 8/29/97, 6/2/00.

### **Illinois Commerce Commission**

- Docket No. 03-0595, In the Matter of the Implementation of the Federal Communications Commission's Triennial Review Regarding Local Circuit Switching in the Mass Market, 1/20/04, 2/24/04.
- Docket No. 02-0864, Illinois Bell Telephone Company Filing to Increase Unbundled Loop And Nonrecurring Rates (Tariffs filed December 24, 2002), 5/6/03, 1/20/04, 2/20/04, 3/5/04.
- Docket No. 00-0393, Illinois Bell Telephone Company Proposed Implementation of High Frequency Portion of Loop (HFPL) / Line Sharing Service, 9/1/00, 9/20/00, 10/4/00.
- Docket Nos. 00-0312 and 00-0313, Petitions of Covad Communications Company and Rhythms Links Inc. for Arbitration Pursuant to Section 252(b) of the Telecommunications Act of 1996 to Establish an Amendment for Line Sharing to the Interconnection Agreement with Illinois Bell Telephone Company d/b/a Ameritech Illinois, and for an Expedited Arbitration Award on Certain Core Issues, 5/15/00, 6/22/00, 11/21/00, 12/12/00, 12/21/00.
- Docket No. 98-0396, Investigation into the Compliance of Illinois Bell Telephone Company with the Order in Docket 96-0486/0569 Consolidated Regarding the Filing of Tariffs and the Accompanying Cost Studies for Interconnection, Unbundled Network Elements and Local Transport and Termination and Regarding End to End Bundling Issues, 3/29/00, 5/5/00, 7/12/00.
- Docket No. 99-0593. Investigation of Construction Charges, 2/17/00, 3/8/00, 3/22/00.
- Docket No. 96-AB-006, In the Matter of the Petition of MCImetro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996 (Ameritech – Illinois), 12/96.

### **Indiana Utility Regulatory Commission**

- Cause No. 42393, In the Matter of the Commission Investigation and Generic Proceeding of Rates and Unbundled Network Elements and Collocation for Indiana Bell Telephone Company, Incorporated, D/B/A SBC Indiana Pursuant to the Telecommunications Act of 1996 and Related Indiana Statutes, 8/15/03.

### **Kansas Corporation Commission**

- Docket No. 00-DCIT-997-ARB, In the Matter of the Petition of Covad Communications Company for Arbitration of Interconnection Rates, Terms, Conditions and Related Arrangements for Line Sharing with Southwestern Bell Telephone Company, 6/12/00.
- Docket No. 00-DCIT-389-ARB, In the Matter of the Petition of DIECA Communications, Inc. d/b/a Covad Communications Company for Arbitration of Interconnection Rates, Terms, Conditions and Related Arrangements with Southwestern Bell Telephone Company, 1/7/00, 1/25/00, 2/21/00.
- Docket Nos. 190, 192-U, In the Matter of a General Investigation into Competition within the Telecommunications Industry in the State of Kansas, 11/14/94.

### **Maryland Public Service Commission**

- **Case No. 8918, In the Matter of the Review of Verizon Maryland Inc.'s Price Cap Regulatory Plan**, 9/13/02.
- Case No. 8921, In the Matter of the Review by the Commission into Verizon Maryland Inc.'s Compliance with the Conditions of 47 U.S.C. § 271(c), 7/15/02.
- Case No. 8879 – In the Matter of the Investigation into Rates for Unbundled Network Elements Pursuant to the Telecommunications Act of 1996, 5/25/01, 9/5/01, 10/15/01.
- Case No. 8745 – In the Matter of the Provision of Universal Service to Telecommunications Consumers, 5/21/01, 6/11/01.
- Case No. 8842 – In the Matter of Rhythms Links Inc. and Covad Communications Company vs. Bell Atlantic-Maryland, Inc., pursuant to Section 252(B) of the Telecommunications Act of 1996, 5/5/00, 7/14/00, 10/27/00.
- Case No. 8820, In the Matter of the Investigation into Affiliated Activities, Promotional Practices and Codes of Conduct of Regulated Gas and Electric Companies, 10/1/99, 10/26/99, 12/10/99.
- Docket No. 8797, In the Matter of The Potomac Edison Company's Proposed: (a) Stranded Cost Quantification Mechanism; (b) Price Protection Mechanism; (c) and Unbundled Rates, 1/26/99.
- Docket No. 8795, In the Matter of Delmarva Power and Light Company's Proposed Stranded Cost Quantification Mechanism, Price Protection Mechanism, and Unbundled Rates, 12/28/98.
- Docket No. 8794, In the Matter of Baltimore Gas and Electric (BGE)'s Proposed Stranded Cost Quantification Mechanism, Price Protection Mechanism, and Unbundled Rates, 12/22/98, 7/23/99, 8/3/99.
- Docket No. 8786, In the Matter of the Investigation of Non-Recurring Charges for Telecommunications Interconnection Service, 5/27/98, 11/16/98, 12/18/98.
- Docket No. 8731, Phase II, In the Matter of the Petitions for Approval of Agreements and Arbitration of Unresolved Issues Arising Under §252 of the Telecommunications Act of 1996, 3/7/97.
- Case No. 8731, In the Matter of the Petitions for Approval of Agreements and Arbitration of Unresolved Issues Arising under Section 252 of the Telecommunications Act of 1996, 10/96.

- Case No. 8715, In the Matter of the Inquiry into Alternative Forms of Regulating Telephone Companies, 11/95, 4/1/96.

#### **Massachusetts Department of Telecommunications and Energy**

- Docket No. DTE 98-57, Investigation by the Department on its own motion as to the propriety of the rates and charges set forth in the following tariffs: M.D.T.E. Nos. 14 and 17, filed with the Department on April 2, 1999, to become effective May 2, 1999, by New England Telephone and Telegraph Company d/b/a Bell Atlantic – Massachusetts, 7/26/99, 11/9/99.

#### **Michigan Public Service Commission**

- Case No. U-13531, In the Matter of, on the Commission's Own Motion, to Review the Costs of Telecommunications Services Provided by SBC Michigan, 1/20/04, 5/10/04.
- Case No. U-13796, In the Matter of, on the Commission's Own Motion, to Facilitate the Implementation of the Federal Communications Commission's Triennial Review Determinations in Michigan, 12/19/03, 2/10/04, 3/5/04.
- Case No. U-12540, In the Matter of the Application of Ameritech Michigan for Approval of Cost Studies and Resolution of Disputed Issues Related to Certain New UNE Offerings, 9/15/00, 10/13/00.
- Case No. U-10755, In the Matter of the Application of Consumers Power Company for Authority to Increase Its Rates for the Sale of Natural Gas and for Other Relief, 6/9/95.
- Case No. U-10685, In the Matter of the Application of Consumers Power Company for Authority to Increase Its Rates for the Sale of Electricity, 3/29/95, 5/5/95.
- Case No. U-10647, In the Matter of the Application of City Signal, Inc., for an Order Establishing and Approving Interconnection Arrangements with Michigan Bell Telephone Company, 8/5/94, 11/7/94, 11/30/94.

#### **Minnesota Public Utilities Commission**

- PUC Docket No. P-999/CI-03-961, In the Matter of the Commission Investigation into ILEC Unbundling Obligations as a Result of the Federal Triennial Review Order, 1/23/04.
- PUC Docket No. P-421/CI-01-1371, In the Matter of a Commission Investigation into Qwest's Compliance with Section 272(c)(2)(B) of the Telecommunications Act of 1996; Checklist Items 1, 2, 4, 5, 6, 11, 13, and 14, 6/10/02, 8/2/02, 8/29/02, 9/10/02.
- PUC Docket No. P-421/CI-01-1370, In the Matter of a Commission Investigation into Qwest's Compliance with Section 272(c)(2)(B) of the Telecommunications Act of 1996; Checklist Items 3, 7, 8, 9, 10 and 12, 1/28/02, 2/22/02.

#### **Missouri Public Service Commission**

- Case No. TO-2001-439, In the Matter of the Determination of Prices, Terms, and Conditions of Conditioning for xDSL-Capable Loops, 6/22/01, 7/13/01.
- Case No. TO-2000-322, In the Matter of the Petition of DIECA Communications, Inc. d/b/a Covad Communications Company for Arbitration of Interconnection Rates, Terms, Conditions and Related Arrangements with Southwestern Bell Telephone Company, 1/7/00, 1/27/00, 2/10/00.

### **Nevada Public Service Commission**

- In re a Petition of the Staff of the Public Utilities Commission to Open a Docket to Investigate Costing and Pricing Issues Related to Industry-Wide Collocation Costs Pursuant to the Telecommunications Act of 1996 and the Commission's Regulations, 11/3/00.
- Docket No. 96-9035, In re a Petition by the Regulatory Operations Staff to Open an Investigation into the Procedures and Methodologies that Should Be Used to Develop Costs for Bundled or Unbundled Telephone Services or Service Elements in the State of Nevada, 5/8/97, 5/23/97.

### **New Jersey Board of Public Utilities**

- Docket No. TO00060356, In the Matter of the Board's Review of Unbundled Network Elements Rates, Terms and Conditions of Bell Atlantic – New Jersey, 10/12/00.
- Docket No. TX95120631, Notice of Investigation into Local Exchange Competition for Telecommunications Services, 8/30/96, 12/20/96.

### **New York Public Service Commission**

- Case No. 98-C-1357, Proceeding on Motion of the Commission to Examine New York Telephone Company's Rates for Unbundled Network Elements, 9/23/99, 10/18/99, 10/22/99, 2/7/00, 2/22/00, 3/31/00, 4/17/00, 6/26/00, 10/19/00, 11/13/00.
- Case Nos. 94-E-0098 and 94-E-0099, Niagara Mohawk Fuel Adjustment Clause Target and S.C. 6 Update Filing, 11/17/95.
- Case Nos. 93-E-0912 and 93-E-1075, Proceeding on Motion of the Commission to Review Long-Run Avoided Cost Estimation Policies and Methods, 5/10/95, 5/31/95.
- Case Nos. 92-E-1055 and 92-G-1056, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations for Central Hudson Gas & Electric Company for Electric Service and Gas Service, respectively, 3/93.
- Case Nos. 92-E-0108 et al., Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Niagara Mohawk Power Corporation for Electric Service, 1992.
- Case Nos. 91-E-0863 et al., Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of New York State Electric & Gas Corporation for Electric Service, 1/92.
- Case Nos. 91-E-0765 et al., Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Rochester Gas & Electric Corporation for Electric Service, 11/91.
- Case No. 91-E-0506, Proceeding on Motion of the Commission as to the Rates, Charges, Rules, and Regulations for Central Hudson Gas & Electric Company for Electric Service, 9/91, 10/91.
- Case Nos. 29327 et al., Niagara Mohawk Power Corporation Financial Recovery Agreement proceeding, 3/91.
- Docket No. 89-E-176, In the Matter of the Proceeding on Motion of the Commission to Examine Ratemaking Practices and Incentive Mechanisms Promoting Least-Cost Planning and Demand-Side Management by Electric Utilities, 4/19/90, 5/4/90, 4/18/91, 6/20/91.



#### **North Carolina Utilities Commission**

- Docket Nos. P-7, Sub 825, and P-10, Sub 479, In the Matter of Petition of Carolina Telephone and Telegraph and Central Telephone Company for Approval of a Price Regulation Plan Pursuant to G. S. 62-133.5, 1/31/96.
- Docket No. P-55, Sub 1013, In the Matter of Application of BellSouth Telecommunications, Inc., for, and Election of, Price Regulation and Motion for a Hearing, 1/28/96, 2/1/96.

#### **Ohio Public Utilities Commission**

- Case No. 02-1280-TP-UNC, In the Matter of the Review of SBC Ohio's TELRIC Costs for Unbundled Network Elements, 5/28/04.
- Case No. 03-2040-TP-COI, In the Matter of the Implementation of the Federal Communications Commission's Triennial Review Regarding Local Circuit Switching in the Mass Market, 12/1/03.
- Case No. 96-922-TP-UNC, In the Matter of the Review of Ameritech Ohio's Economic Costs for Interconnection, Unbundled Network Elements, and Reciprocal Compensation for Transport and Termination of Local Telecommunications Traffic, 10/6/00.

#### **Oklahoma Corporation Commission**

- Cause No. PUD 200000192, Applicant: Southwestern Bell Telephone Company; Relief Sought: Approval of Nonrecurring Rates for Conditioning Unbundled Digital Subscriber Line ("DSL") Capable Loops, 7/12/00, 8/1/00.

#### **Oregon Public Utility Commission**

- Case No. UM-731, Phase IV, In the Matter of the Investigation of Universal Service in the State of Oregon, 1/17/00.

#### **Pennsylvania Public Utility Commission**

- Docket No. R-00016683, Generic Investigation of Verizon Pennsylvania, Inc.'s Unbundled Network Element Rates, 12/7/01, 1/11/02, 2/8/02.
- Docket No. M-00001353, Re Structural Separation of Verizon-Pennsylvania Inc. Wholesale and Retail Operations, 10/10/00.
- Docket No. R-00005261, In re: Further Pricing of Bell Atlantic Pennsylvania, Inc.'s Unbundled Network Elements, 10/4/00.
- Docket Nos. R-00994697 and R-994697C0001, Pennsylvania Public Utility Commission v. Bell Atlantic – Pennsylvania, Inc./ Rhythms Links Inc., Complainant v. Bell Atlantic – Pennsylvania, Inc., Respondent, 12/21/99, 1/14/00.
- Docket Nos. P-00991648, Joint Application of NEXTLINK Pennsylvania, Inc., et al. and P-00991649, Joint Application of Bell Atlantic – Pennsylvania, Inc., et al., 4/22/99, 6/11/99.
- Docket Nos. A-310200F0002 et al., In re the Joint Application of Bell Atlantic Corporation and GTE Corporation for Approval of Agreement and Plan of Merger, 3/23/99, 5/19/99.
- Docket No. I-00960066, Generic Investigation of Intrastate Access Charge Reform, 6/30/97, 7/29/97, 8/27/97.

- Docket No. A-31023670002, In the Matter of the Application of MCI Metro Access Transmission Services, Inc. for a Certificate of Public Convenience and Necessity to Provide and Resell Local Exchange Telecommunications Services in Pennsylvania, 9//96.
- Petition for Arbitration by AT&T-PA for an Interconnection Agreement with GTE-PA, 9/96.
- Petition for Arbitration by Eastern TeleLogic for an Interconnection Agreement with Bell Atlantic - Pennsylvania, 9/96.
- Petition for Arbitration by AT&T-PA for an Interconnection Agreement with Bell Atlantic - Pennsylvania, 9/96.
- Docket No. I-940035, Formal Investigation to Examine and Establish Updated Universal Service Principles and Policies for Telecommunications Services, 1/11/96, 2/14/96, 2/27/96.
- Docket No. A-310203F002, Application of MFS Intelenet of Pennsylvania, Inc., for Approval to Operate as a Local Exchange Telecommunications Company, 1/30/95, 2/22/96, 3/22/96, 1/13/97, 2/97.

#### **South Carolina Public Service Commission**

- Docket No. 95-720-C, Application of BellSouth Telecommunications, Inc. d/b/a Southern Bell Telephone and Telegraph Company for Alternative Regulation, 8/21/95, 9/11/95.
- Docket No. 95-862-C, Re: BellSouth Telecommunications, Inc. d/b/a Southern Bell Telephone and Telegraph Company Investigation of Level of Earnings, 8/21/95, 9/11/95.

#### **Tennessee Regulatory Authority**

- Docket No. 97-00309, In Re: BellSouth Telecommunications, Inc.'s Entry into Long Distance (interLATA) Service in Tennessee Pursuant to Section 271 of the Telecommunications Act of 1996, 7/11/02.

#### **Texas Public Utility Commission**

- Docket No. 28607, Impairment Analysis of Local Circuit Switching for the Mass Market, 2/9/04, 3/19/04.
- Docket No. 28600, Arbitration of Phase I Costing Issues for Successor Interconnection Agreements to the Texas 271 Agreement, 12/5/04, 1/5/04.
- Docket No. 25834, Proceeding on Cost Issues Severed from P.U.C. Docket No. 24542, 11/4/02, 2/14/03.
- Docket Nos. 22168, Petition of IP Communications Corporation to Establish Public Utility Commission of Texas Oversight Concerning Line Sharing Issues and 22469, Complaint of Covad Communications Company and Rhythms Links, Inc. against Southwestern Bell Telephone Company and GTE Southwest Inc. for Post-Interconnection and Arbitration under the Telecommunications Act of 1996 Regarding Rates, Terms, Conditions and Related Arrangements for Line-Sharing, 5/17/00, 9/5/00 (rev. 10/6/00), 10/20/00.
- Docket Nos. 20226, Petition of Accelerated Connections, Inc. d/b/a ACI Corp. for Arbitration to Establish an Interconnection Agreement with Southwestern Bell Telephone Company, and 20272, Petition of DIECA Communications, Inc., d/b/a Covad Communications Company for Arbitration of Interconnection Rates, Terms and

Conditions and Related Arrangements with Southwestern Bell Telephone Company, 2/19/99, 4/8/99.

#### **Vermont Public Service Board**

- Docket No. 5780, Green Mountain Power Company General Rate Case, 1/13/95.
- Docket No. 5695, Tariff Filing of Green Mountain Power Company Requesting an 8.60% Rate Increase to Take Effect 11/15/93, 1/94.

#### **Virginia State Corporation Commission**

- Petitions for Arbitration of AT&T-VA and MCI Communications Corporation for an Interconnection Agreement with Bell Atlantic - Virginia, 9/20/96.
- Petition for Arbitration of AT&T-VA for an Interconnection Agreement with GTE-VA, 8/96, 10/29/96.

#### **Washington Utilities and Transportation Commission**

- Docket No. UT-960639 et al., Phase II, In the Matter of the Pricing Proceeding for Interconnection, Unbundled Elements, Transport and Termination, and Resale, 8/20/98, 9/11/98.
- Docket No. UT-950200, Washington Utilities and Transportation Commission vs. U S WEST Communications, Inc., 8/28/95, 12/15/95.
- Docket No. UT-941464 et al., Washington Utilities and Transportation Commission vs. U S WEST Communications, Inc., 4/17/95, 5/31/95.
- Docket No. UT-911488 et al., Washington Utilities and Transportation Commission vs. U S WEST Communications, Inc.

#### **Wisconsin Public Service Commission**

- Docket No. 6720-TI-187, Petition of Wisconsin Bell, Inc., d/b/a SBC Wisconsin, to Establish Rates and Costs for Unbundled Network Elements, 6/15/04.
- Docket Nos. 6720-MA-104 and 3258-MA-101, In the Matter of the Petition of MCImetro Access Transmission Services, Inc. for Arbitration of Interconnection Rates, Terms, and Conditions Pursuant to 47 U.S.C. § 252(b) of the Telecommunications Act of 1996 (Ameritech – Wisconsin), 12/96.

#### **Civil Proceedings**

- Global NAPS, Inc., Plaintiff, v. Verizon New England, Inc., d/b/a Verizon Massachusetts, Defendant, Civil Action No. 02-12489-RWZ, Civil Action No. 05-10079-RWZ, filed in District of Massachusetts, 10/16/06, 11/15/06.
- Nationwide Business Telephones and Team Centrex, Plaintiffs, vs. Introlink Communication Systems, Inc., Pacific Bell, Inc., et al., Defendants, 5/96.
- Power Producers v. Pacific Gas & Electric, 6/93.
- WindTec, Inc. v. Southern California Edison Company, 7/90.

## **EDUCATION**

- A.B.,** Oberlin College, Oberlin, Ohio. Major: Economics. National Merit Scholar, recipient of Hanson Prize in Economics, elected to Phi Beta Kappa.
- M.A.,** M.Phil., Yale University, New Haven, Connecticut. Economics. Admitted to Ph.D. candidacy and completed all Ph.D. requirements except dissertation. Fields of specialization included industrial organization and energy and environmental economics. Honorable mention, National Science Foundation Fellowship; recipient of University Fellowship and Sloan Foundation dissertation research fellowship.